

Figure 1A

Prior Art

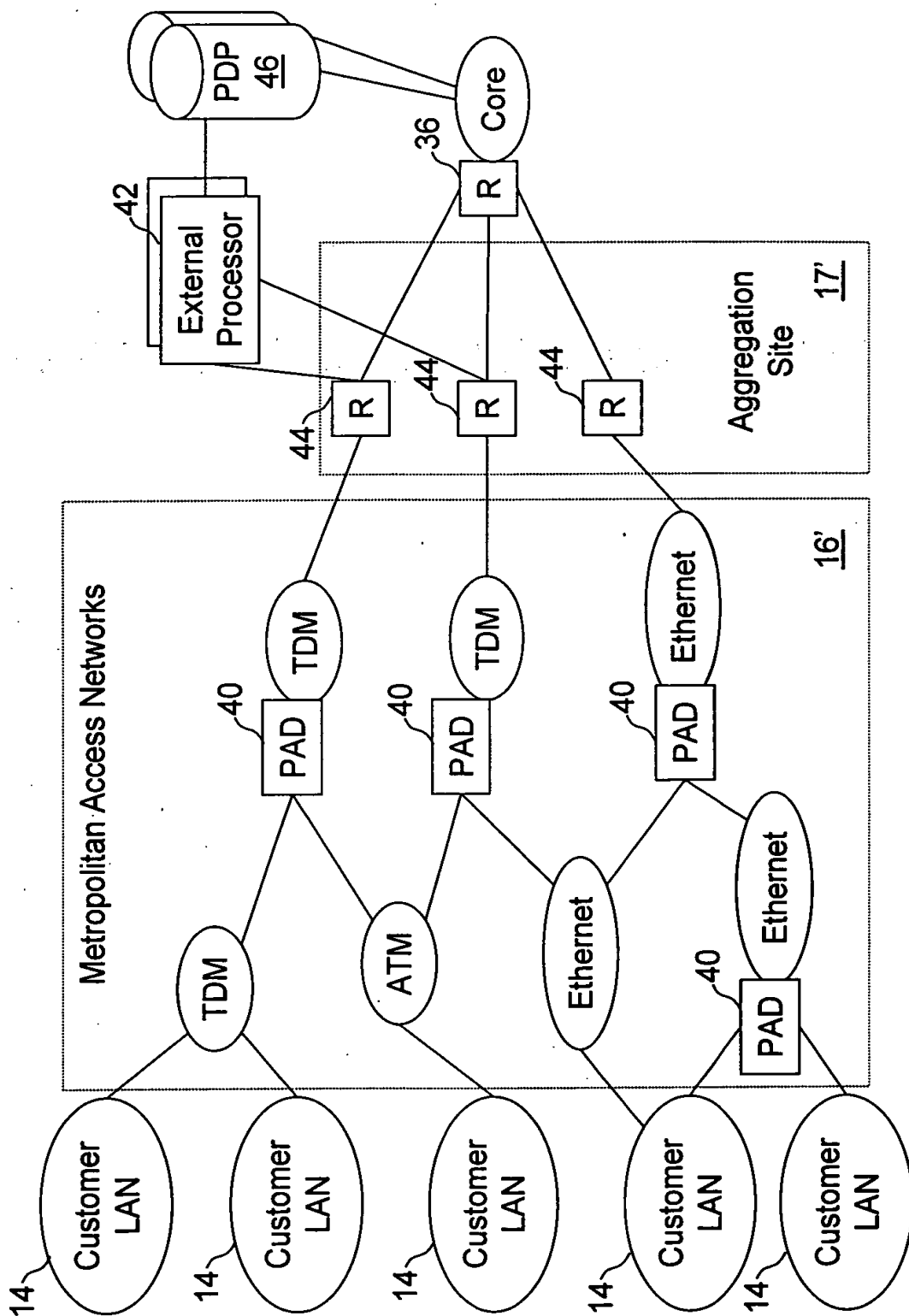


Figure 1B



**Fig. 2**



Fig. 3



Fig. 4

```
sequenceDiagram
    participant P as Primary SC
    participant PAD as PAD
    participant S as Secondary SC
    P->>P: 1. Connection Abort
    PAD->>PAD: 2. KeepAlive timeout  
-Primary SC fails
    PAD->>S: 3. SYN
    S->>PAD: 4. SYN_ACK
    PAD->>S: 5. ACK
    PAD->>S: 6. Upload Active Sessions
    S->>PAD: 7. ACK
    PAD->>S: 8. KeepAlive
```

The diagram illustrates the failover process between a Primary SC and a Secondary SC. The Primary SC initiates a connection abort. The PAD (Primary Agent Daemon) then experiences a KeepAlive timeout, indicating the Primary SC has failed. The PAD then sends a SYN message to the Secondary SC. The Secondary SC responds with a SYN\_ACK, followed by an ACK from the PAD. The PAD then uploads active sessions to the Secondary SC, which responds with an ACK. Finally, the PAD sends a KeepAlive message to the Secondary SC to establish a new connection.

```

sequenceDiagram
    participant Primary SC
    participant PAD
    participant Secondary SC

    Primary SC->>PAD: 1. SYN
    PAD->>Primary SC: 2. SYN ACK
    Primary SC->>PAD: 3. ACK
    Primary SC->>PAD: 4. Upload Active Sessions
    Primary SC->>PAD: 5. ACK
    PAD->>Secondary SC: 6. Prepare to Shutdown
    PAD->>Secondary SC: 7. FIN
    Secondary SC->>PAD: 8. ACK
    Secondary SC->>PAD: 9. FIN
    PAD->>Secondary SC: 10. ACK
    PAD->>PAD: 10. Delete PAD state information
  
```

**Fig. 5B**

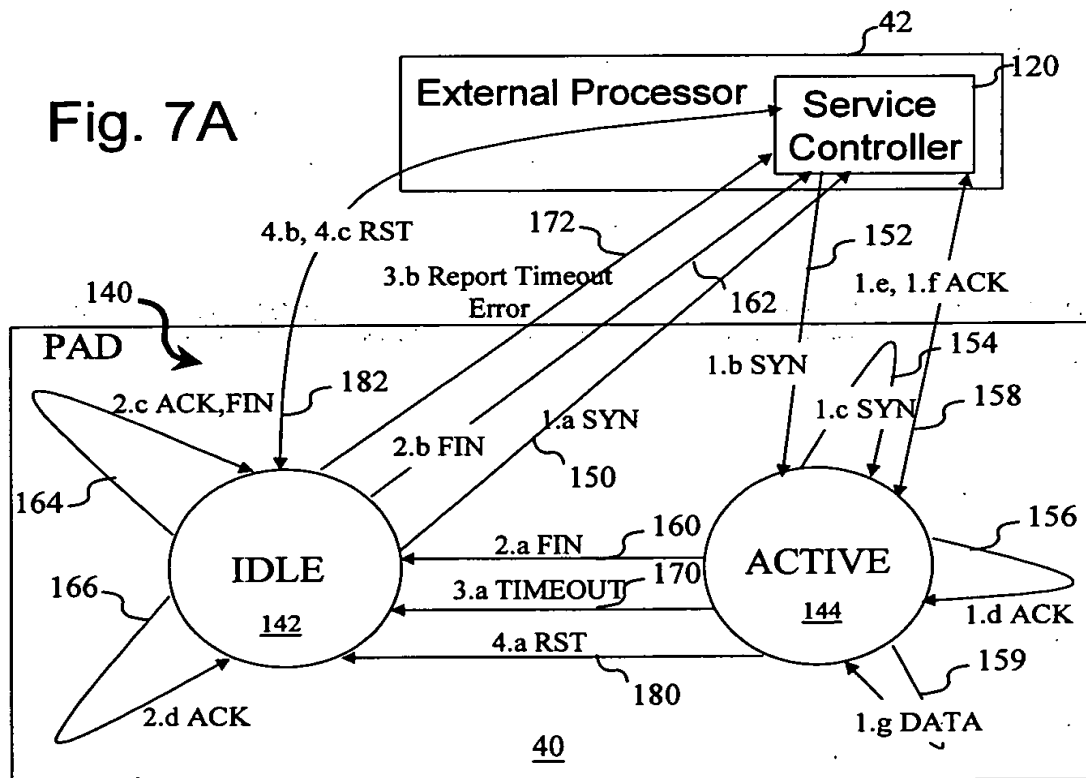
```

sequenceDiagram
    participant CS as Customer Site
    participant PAD as PAD 40
    participant RBSC as RBSC 120
    participant PDP as PDP 48
    participant Network as Network

    CS->>PAD: 1. RSVP PATH
    PAD->>RBSC: 2. PATH
    RBSC->>PDP: 3,4. COPS
    PDP->>RBSC: 5. PATH
    RBSC->>Network: 6. PATH
    RBSC->>Network: 7. RESV
    PAD->>RBSC: 8. RESV
    RBSC->>PDP: 9,10. COPS
    PDP->>Network: 11. SVC or LSP ESTABLISH
    RBSC->>PAD: 13. Update PAD
    RBSC->>Network: 12. CONNECT or CONFIRM
    PAD->>RBSC: 14. RESV
    RBSC->>CS: 15. RESV
    PAD->>RBSC: 16. CONFIRM
    RBSC->>Network: 17. CONFIRM
  
```

The diagram illustrates the sequence of messages for service establishment between the Customer Site, PAD (40), RBSC (120), PDP (48), and the Network. The process begins with the Customer Site sending a message to the PAD, followed by a series of messages between the PAD, RBSC, PDP, and the Network, culminating in a confirmation from the RBSC to the Network.

**Fig. 7A**



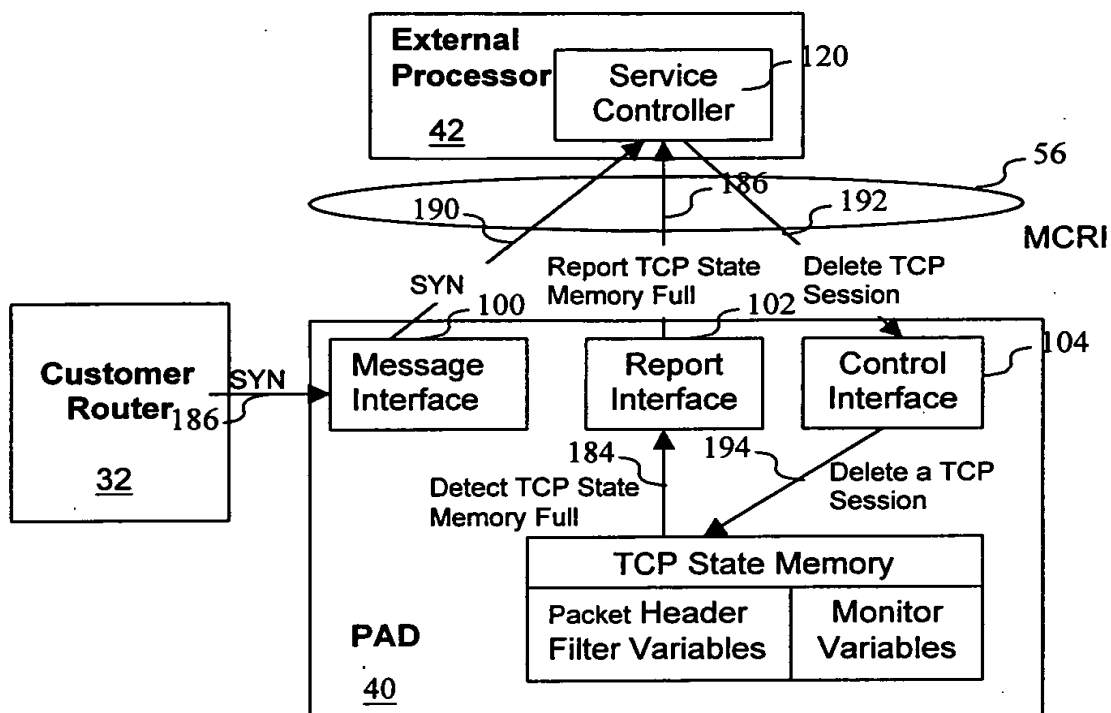


Fig. 7B

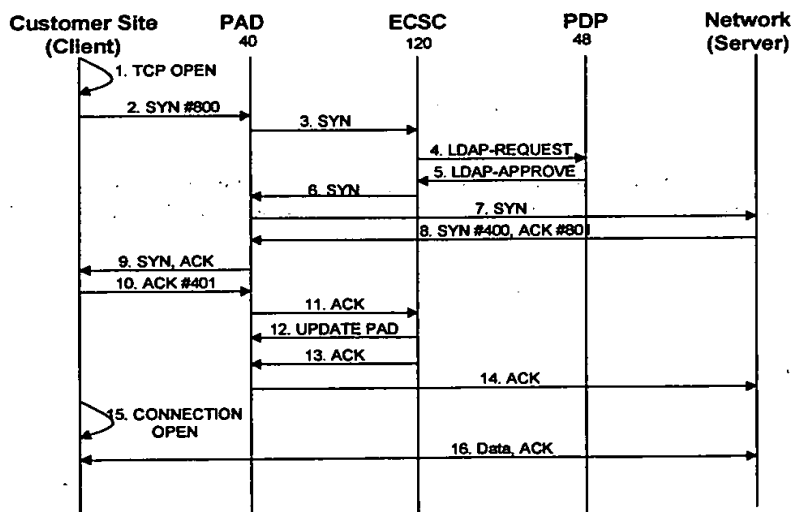


Fig. 7C



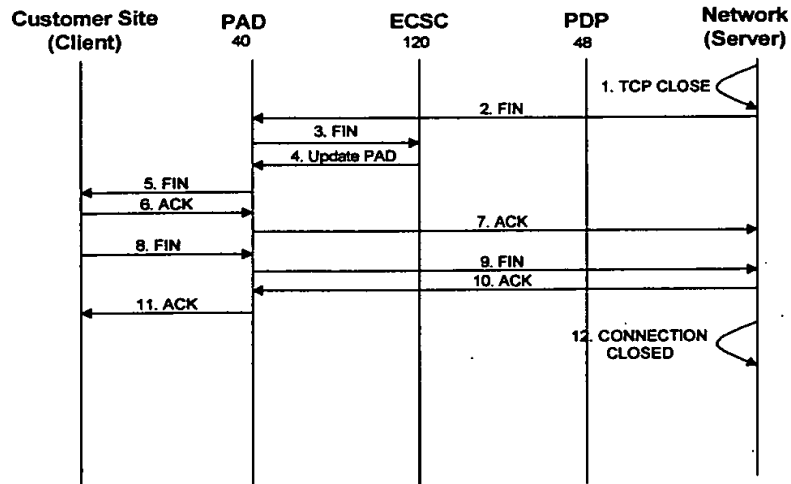


Fig. 7D

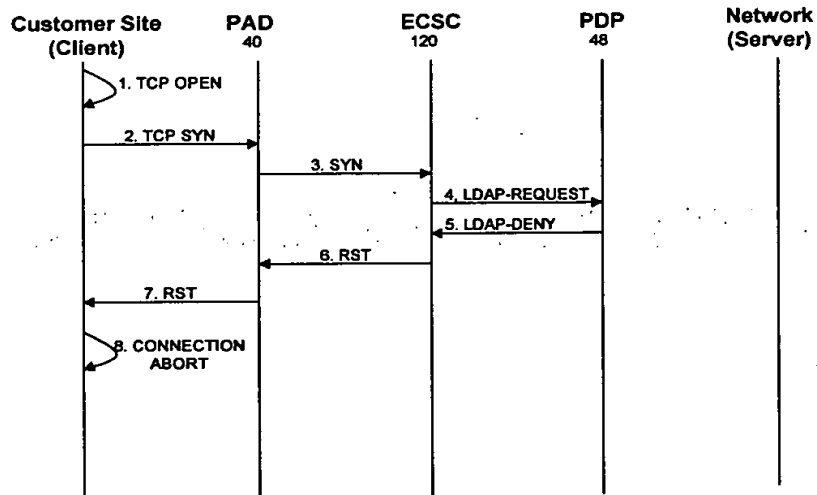
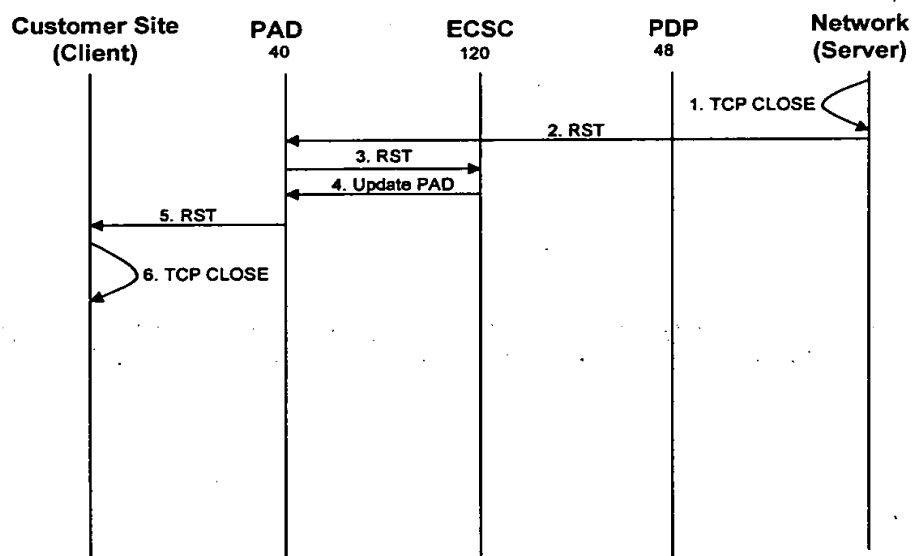
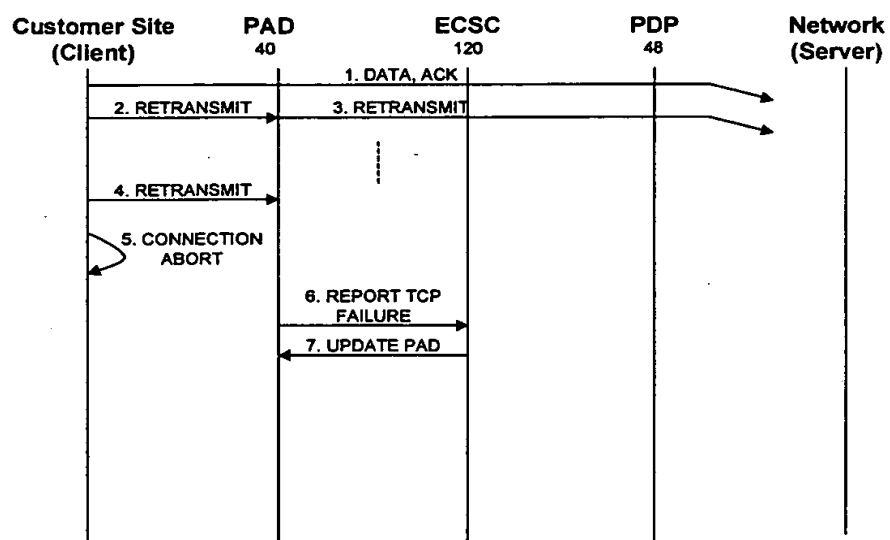


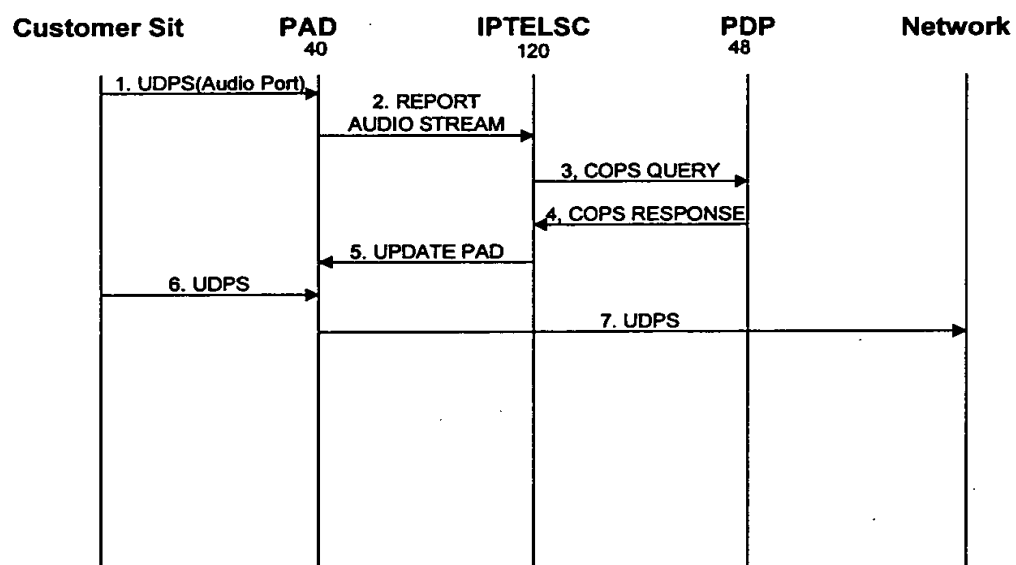
Fig. 7E



| Customer Site | PAD<br>40           | IPTELSC<br>120         | PDP<br>48                | Network |
|---------------|---------------------|------------------------|--------------------------|---------|
|               | 1. UDPS(Audio Port) |                        |                          |         |
|               |                     | 2. REPORT AUDIO STREAM |                          |         |
|               |                     |                        | 3. COPS QUERY            |         |
|               |                     |                        | 4. COPS DECISIONS        |         |
|               | 5. UPDATE PAD       |                        |                          |         |
|               | 6. RSVP PATH        |                        |                          |         |
|               |                     |                        | 7. PATH                  |         |
|               |                     |                        | 8. RESV                  |         |
|               | 9. RESV             |                        |                          |         |
|               |                     |                        | 10,11. COPS              |         |
|               |                     |                        | 12. SVC or LSP ESTABLISH |         |
|               |                     |                        | 13. CONNECT or CONFIRM   |         |
|               | 14. Update PAD      |                        |                          |         |
|               | 15. CONFIRM         |                        |                          |         |
|               |                     |                        | 16. CONFIRM              |         |
|               |                     |                        | 17. UDPS                 |         |

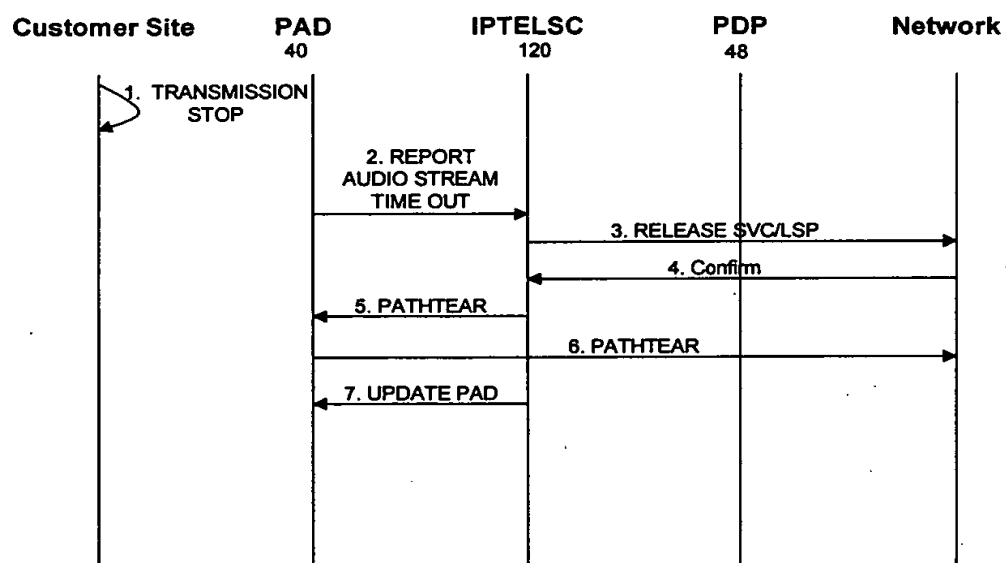
**Fig. 8A**

The first part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1.1) as  $\epsilon \rightarrow 0$ . In the second part, we study the asymptotic behavior of the solutions of the system (1.1) as  $\epsilon \rightarrow 0$ . In the third part, we study the asymptotic behavior of the solutions of the system (1.1) as  $\epsilon \rightarrow 0$ .

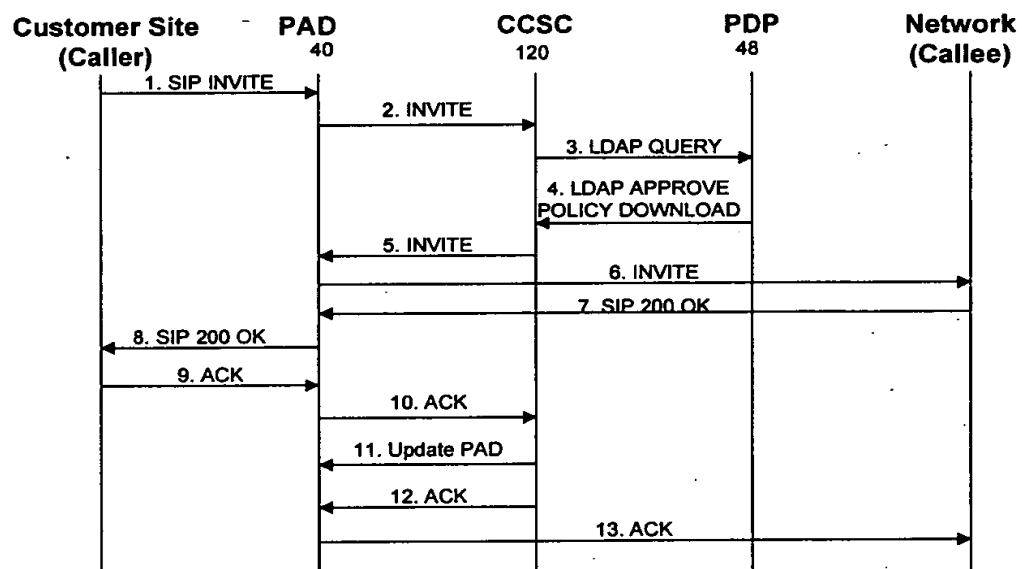


**Fig. 8B**

1. **Содержание**  
 2. **Введение**  
 3. **Глава I. Общие положения**  
 4. **Глава II. Организация и структура**  
 5. **Глава III. Основные задачи и функции**  
 6. **Глава IV. Методы и средства**  
 7. **Глава V. Результаты и выводы**  
 8. **Заключение**  
 9. **Список литературы**  
 10. **Приложения**

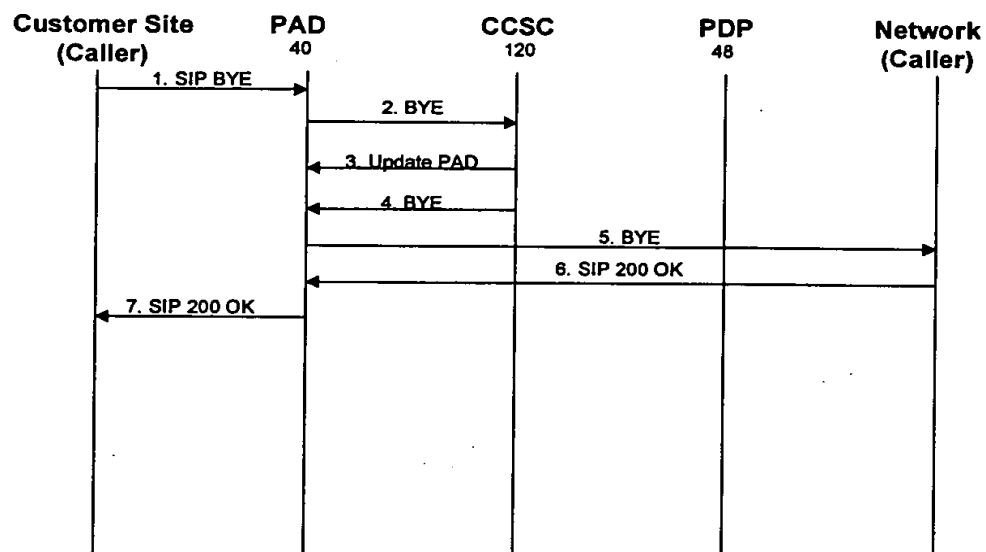


**Fig. 8C**

[illegible]

**Fig. 9A**

**Fig. 9B**



```

sequenceDiagram
    participant CS as Customer Site (Caller)
    participant PAD as PAD 40
    participant CCSC as CCSC 120
    participant PDP as PDP 48
    participant N as Network (Caller)

    Note over CCSC: 1. SESSION TIME LIMIT REACHED
    CCSC->>PAD: 2. Update PAD
    PAD->>CCSC: 3. BYE
    PAD->>CS: 4. BYE
    CS->>PAD: 6. SIP 200 OK
    PAD->>N: 5. BYE
    N->>PDP: 7. SIP 200 OK
    PDP->>N: 7. SIP 200 OK
  
```

The diagram illustrates the sequence of SIP messages during a session termination. The participants involved are the Customer Site (Caller), PAD (40), CCSC (120), PDP (48), and the Network (Caller). The sequence of events is as follows:

- 1. SESSION TIME LIMIT REACHED:** A self-message on the CCSC lifeline.
- 2. Update PAD:** A message from CCSC to PAD.
- 3. BYE:** A message from PAD to CCSC.
- 4. BYE:** A message from PAD to the Customer Site.
- 6. SIP 200 OK:** A message from the Customer Site to PAD.
- 5. BYE:** A message from PAD to the Network.
- 7. SIP 200 OK:** A message from the Network to PDP.

```

sequenceDiagram
    participant CS as Customer Site (Caller)
    participant PAD as PAD 40
    participant CCSC as CCSC 120
    participant PDP as PDP 48
    participant N as Network (Callee)

    PAD->>PAD: 1. SESSION INACTIVITY TIMEOUT
    PAD->>CCSC: 2. REPORT TIMEOUT ERROR
    CCSC->>PAD: 3. Update PAD
  
```

**Fig. 9D**



```

sequenceDiagram
    participant Caller as Customer Site (Caller)
    participant PAD as PAD 40
    participant CCSC as CCSC 120
    participant PDP as PDP 48
    participant Network as Network (Callee)

    Caller->>PAD: 1. SIP INVITE
    PAD->>CCSC: 2. INVITE
    CCSC->>PDP: 3. LDAP QUERY
    PDP->>CCSC: 4. LDAP APPROVE POLICY DOWNLOAD
    CCSC->>PAD: 5. INVITE
    PAD->>Network: 6. INVITE
    Network-->>PAD: 7. SIP 606 NOT ACCEPTABLE
    PAD->>CCSC: 8,9. SIP 606
    CCSC-->>Caller: 10. SIP 606
    Caller->>PAD: 11. INVITE, TIMER=120
    PAD->>CCSC: 12. INVITE, TIMER=120
    CCSC->>PAD: 13. INVITE, TIMER=100
    PAD->>Network: 14. INVITE, TIMER=100
    Network->>PAD: 15. SIP 200 OK TIMER=100
    PAD->>CCSC: 16,17. OK, TIMER=100
    CCSC->>Caller: 18. OK, TIMER=100
    Caller->>PAD: 19. ACK, TIMER=100
    PAD->>CCSC: 20. ACK, TIMER=100
    CCSC->>PAD: 21. Update PAD
    PAD->>CCSC: 22. ACK, TIMER=100
    CCSC->>Network: 23. ACK, TIMER=100
  
```

**Fig. 9E**

```

sequenceDiagram
    participant CS as Customer Site (host)
    participant PAD as PAD 40
    participant MSC as MSC 120
    participant PDP as PDP 48
    participant ER as Edge Router

    CS->>PAD: 1. Join-Group Report
    PAD->>MSC: 2. Join-Group Report
    MSC->>PDP: 3. LDAP-Request
    PDP->>MSC: 4. LDAP-Approve
    MSC->>PAD: 5. Join-Group Report
    MSC->>ER: 6. Join-Group Report
    ER->>ER: 7. Add the new multicast group
  
```

```

sequenceDiagram
    participant CS as Customer Site (host)
    participant PAD as PAD 40
    participant MSC as MSC 120
    participant PDP as PDP 48
    participant ER as Edge Router

    CS->>PAD: 1. Join-Group Report
    PAD->>MSC: 2. Join-Group Report
    MSC->>PDP: 3. LDAP-Request
    PDP->>MSC: 4. LDAP-Reject
    MSC->>MSC: 5. Drop Join-Group Report
    MSC->>MSC: 

```

**Fig. 10B**

```

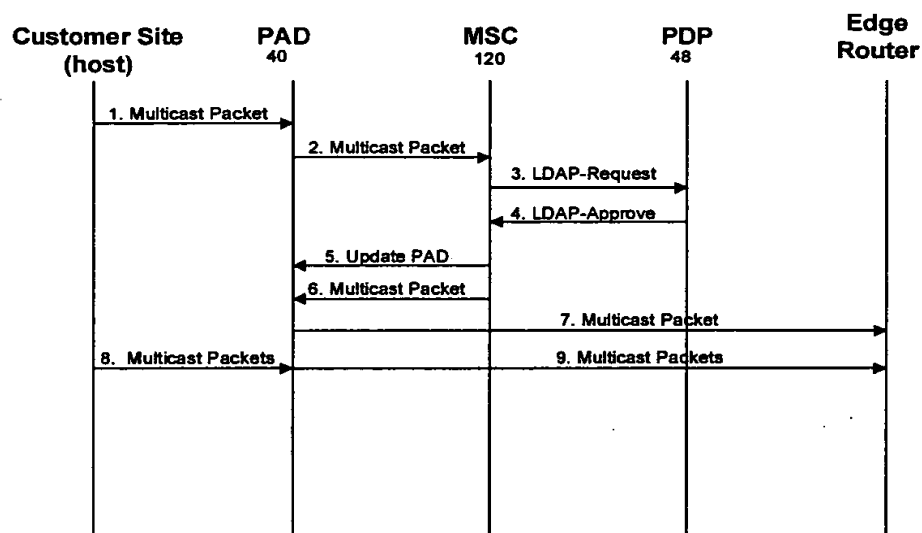
sequenceDiagram
    participant CS as Customer Site (host)
    participant PAD as PAD 40
    participant MSC as MSC 120
    participant PDP as PDP 48
    participant ER as Edge Router

    PAD->>MSC: 1. Host Membership Query
    MSC->>PAD: 2 Membership Query
    MSC->>PDP: 3. LDAP-Request
    PDP->>MSC: 4. LDAP-Approve
    PAD->>MSC: 5 Membership Query
    PAD->>CS: 6 Membership Query
  
```

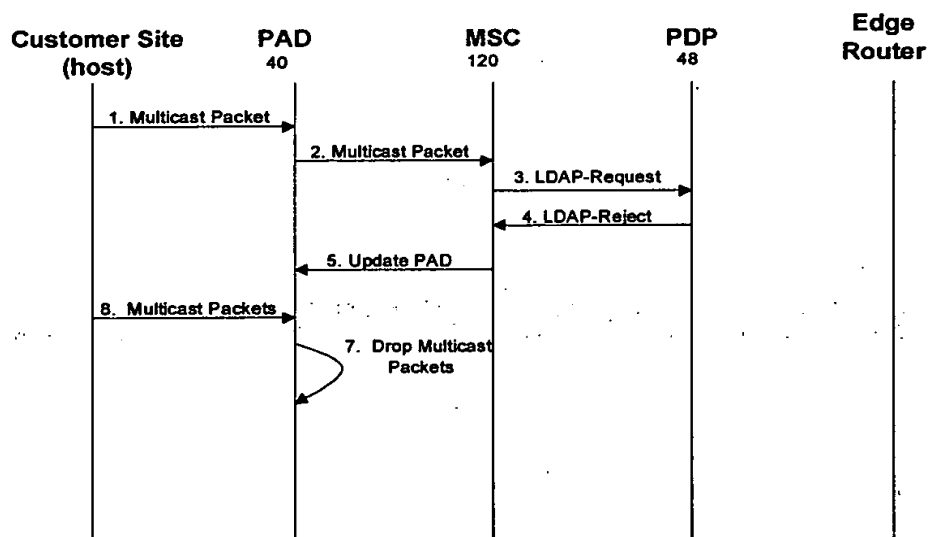
```

sequenceDiagram
    participant CS as Customer Site (host)
    participant PAD as PAD 40
    participant MSC as MSC 120
    participant PDP as PDP 48
    participant ER as Edge Router

    PAD->>MSC: 1. Host Membership Query
    MSC->>PAD: 2 Membership Query
    MSC->>PDP: 3. LDAP-Request
    PDP->>MSC: 4. LDAP-Reject
    MSC->>MSC: 5 Drop Membership Query
  
```

[illegible]

**Fig. 10E**



**Fig. 10F**

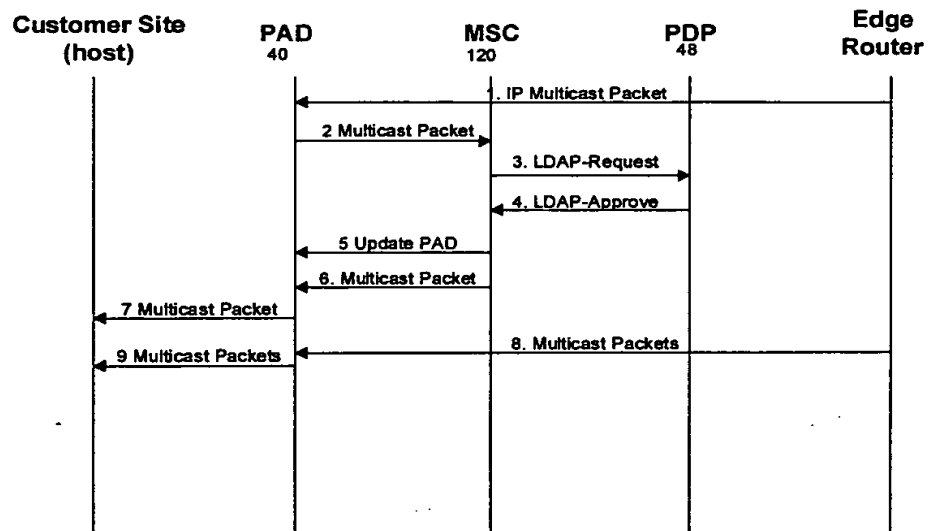


Fig. 10G

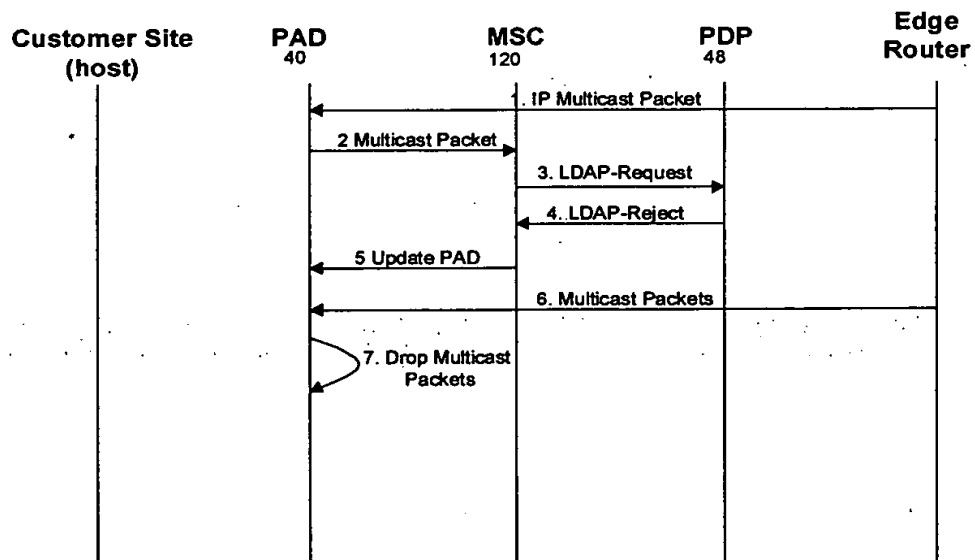


Fig. 10H